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ABSTRACT

These studies aim to determine whether a partner's social role and extent of incorrectness were factors capable of interfering with the effects of social marking in spatial transformation tasks. Social marking refers to a condition in which correspondence exists between cognitive relations and some social relation. Experiment 1 assigned 68 non-conserving kindergarten children and first grade students to two conditions with socially marked materials (model schoolroom) and two with socially unmarked materials (model village) crossed by two conditions with a systematically incorrect adult and two with another nonconserving child. Pretesting required subjects to reconstruct a model village on a base oriented differently from a standard model. In the experimental interaction phase subjects were placed in an easy position from which tasks with marked or unmarked materials would pose no cognitive problems and were confronted by partners occupying a position made difficult because, from their perspective, the orientation of the bases was reversed. Posttesting placed individual subjects in the difficult position and employed socially unmarked, model village materials. In the interaction phase, groups using socially marked materials produced more correct performances than groups using unmarked materials, and in the posttest phase, groups using socially marked materials progressed more than groups using unmarked materials. Results of experiment 2 indicated that social marking produced less progress when the adult's model is less perceptually incorrect. (RH)

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SOCIAL MARKING AND SOCIO-COGNITIVE CONFLICT IN SPATIAL TRANSFORMATION TASKS

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SUMMARY

It is demonstrated (Doise and Mugny, 1981) that in a task of spatial transformation non-conserver can progress if confronted with a partner giving an incorrect solution from an opposite point of view. When the partner is an adult the child tedency to comply is overcome by social marking of materials. In order to assess the efficacy of social marking, the incorrect partner's age and the perceptual evidence of the incorrect partner's solution were manipulated. In experiment 1, 68 non conserver Ss (kindergarten and first grade) were assegned to one of four conditions: two marked and two unmarked, two with adult and two with child. On individual post-test significant interaction was found between the partner's age and material. Experiment 2 (N= 27 non-conserver Ss) indicated that social marking produce less progress if the adult model is less incorrect perceptually.

It has been demonstrated (see Doise and Mugny (1981) for a review) that non-conserver children can progress in spatial transformation tasks if their point of view does not imply any elaborated transformation. This is possible when the child is confronted with a partner giving an incorrect solution from an opposite point of view. When the partner is an adult, progess will appear in a condition where children may oppose the adult's incorrect solution. This is the case of social marking, i.e. where corrispondence exists between cognitive relations and some social relation. De Paolis et al. (1981) compared two experimental conditions in a situation opposing an adult and a child. One employed the usual material of a village, the other the socially marked material based on the school room. In this latter condition, the child more frequently opposes the adult, responding to social necessity of conserving social relations between pupils and teachers, and gives a cognitive resolution to the socio-cognitive conflict, allowing cognitive progress.

The aim of our work was to check experimentally whether the partner's social role and the degree of incorrectness of the model proposed by the partner were factors capable of interfering with the mechanism of social marking in determining the solution of social interaction and possible changes in the S's cognitive system.

EXPERIMENT 1

Experiment 1 checks the effects of social marking in an interaction in which the social status of the incorrect partner, being of the same age-group, is not higher than that of the experimental S. In this situation the conflict between the two positions should be inferior to that of the child-adult interaction.

If the social marking of the material is indipendent of the type of social interaction, no differences should be found on post-test between the group having the same age-group partner and that having an adult partner. On the other hand, both group should show greater progress in comparison to the groups with unmarked material (with adult and the same age-group partner).

If, on the other hand, the social role of the partner interacts with the social marking effect, ther will be less progress in the group marked with the same age partner in comparison to the one marked with the adult partner, but not respect to the unmarked groups (with adult and same age-group partner).

METHOD

Subjects . 202 children were pretested, ranging in age from 5.6 to 7.1 years.

Procedure . The pretest was based on the conservation of spatial relations (Mugny and Doise, 1978). It involves a model village constructed by the experimenter on a base depicting a reference mark; the child is required to reconstruct the same village on an identical but differently-oriented base (see fig. 1). Individual pretesting (allowing retention within the experiment of teh non-conserver: 58 Ss) is followed by an interaction phase, in which the experimental manipulations are introduced, and by an individual post-test (allowing evaluation of each partecipant's progress). The pretest was composed of a simple item which, for correct reconstruction, required the ensemble to be rotated by 90°, and two complkex items, on which the S had to perform a transformation by inverting the left/right and front/behind relations.

The post-test used the two complex items with three houses and another complex one with five houses, the latter being more difficult to solve because of the multiple intersections of the two dimensions (left/right and front/behind).

The experimental phase only included Ss who, on both complex item of the pretest, produced lower-level responses, i.e. Ss which translated the ensemble of the village and/or took into account the 90° rotation of the support but not the relation between the indexes (Ss NC= no compensation). Ss who totally compensated the rotation (Tc) and those who partially compensated for changes in orientation (PC) were excluded from the experimental phase.

Experimental Ss were placed in an easy position (E), form which the task would pose no cognitive problems (see Fig. 2). They were confronted by partners occuping a difficult position (D), involving a cognitive problem by virtue of the fact that the orientation of the bases is reversed from this perspective.

Four conditions were compared in this experiment:

1) 13 Ss interacted with an adult who, placed in the difficult position, systematically gave incorrect responses. This condition used the socially marked material of the school-room.

2) 13 Ss interacted with an incorrect adult, using the usual material of the village.

3) 9 Ss interacted with 9 non-conserver children using the school-room.

4) 7 ss interacted with 7 non-conserver children using the village.

In the post-test (village) Ss were placed in the difficult position: progress was evaluated both as mean number of houses palced correctly, as well as general strategy of solution (see Table 1).

TABLE 1

Post-test levels obtained by crossing best responnes on the 2 complex items with 3 houses with those on the item with 5 houses.

		Response to 5 houses item		
		NC	PC	TC
Best response to the 3-houses items	NC	N	INT-	INT0
	PC	INT-	INT0	INT+
	TC	INT0	INT+	S

Table 1 shows the levels obtained from the lowest (N= No compensation on both 3 and 5 hoses items) to the highest (S= higher, TC in both cases), passing through intermediates (INT-; INT0; INT+).

RESULTS

In the interaction phase the socially marked groups produced more correct performances than the two non-socially marked groups (see Table 2).

TABLE 2

Mean number (max=16 per cell) of correct collocations of easy (E) Ss in interaction phase as a function of partner's age and type of material

	Type of material	
Partner	Marked	Unmarked
Adult	14.77	8.90
Child	13.55	10.43

Data were analyzed by partner (2) X material (2) ANOVA for unequal sample sizes. Significant main effect was material: $F(1,38)= 8.2$, $p<.006$.

In condition 1 children more frequently opposed the adult incorrect response than in condition 2. In crucial condition 3, children in the difficult position

(non-conserver on pretest) frequently gave correct responses (see Table 3), significantly more than difficult children in condition 4: for correct collocation and orientation $t(14) = 1.79$, $p < .05$ (one tailed), for correct orientation only $t(14) = 3.9$, $p < .005$ (one tailed).

TABLE 3

Mean number (max=16 per cell) of correct collocations and correct orientation (a) and correct orientation (b) of elements in difficult Ss' copy in condition 3 and 4

Condition/Performance	(a)	(b)
3 (Child + Child, marked)	4.88	12.80
4 (Child + Child, unmarked)	0.57	2.50

This fact confirms De Paolis's results (De Paolis, quoted in Mugny, De Paolis and Carugati, 1984) that social marking of material also improves performances of Ss who work individually during the experimental phase.

In condition 3, because of the correct responses of Ss in the difficult position, there is no socio-cognitive conflict; on the contrary, in condition 4 the Ss in the difficult position produce incorrect responses and the Ss in the easy position, in some casess, adopted a strategy of compliance, significanlty more than easy Ss in condition 3, chi-square $(1) = 14$, $p < .001$ (Table 4)

TABLE 4

Frequency of compliance to incorrect responses of difficult partner in easy Ss of condition 3 and 4

Condition/ Response	Compliance	No Compliance
3 (Child + Child, marked)	6	94
4 (Child + Child, unmarked)	27	81

It was impossible to compare imitative behaviors towards the incorrect adult model of condition 1 and 2 (see Table 5: as in De Paolis et al (1981), in condition 2 children more frequently reproduced the adult incorrect model than in condition 1, $t(14) = 2.07$, $p < .025$, one tailed)

with compliant responses to conditions 3 and 4, since the child partner did not systematically show an incorrec model.

TABLE 5

Mean number (max= per cell) of strategies of compliance in conditions with adult partner

Condition 1 (marked)	1.23
Condition 2 (unmarked)	4.91

The individual post-test (village) showed that socially marked groups 1 and 3 progressed more than socially unmarked groups 2 and 4. Nevertheless, both non-parametric (Jonckheere test; Leach, 1979) and parametric (ANOVA) analyses indicated that there is significant interaction between the social status of the partner who is in the difficult position and the type of material (Tables 6 and 7).

TABLE 6

Mean number (Max = 11 per cell) of correct responses in post-test session by partner's age and type of material.

	Type of material	
Partner	Marked	Unmarked
Adult	5.61	1.31
Child	1.00	2.71

Data of Table 6 were analysed by partner's age (2) X material (2) ANOVA for unequal sample sizes. Significant main effetc was material. $F(1,38) = 4.02$, $p<.049$, and interaction effect between material and partner's age: $F(1,38) = 9.65$, $p<.003$.

Post-hoc analyses (Newman-Keuls test) indicated that group 1 (adult,marked) progressed more than group 2 (adult, unmarked) and group 3 (child, marked). On the other hand, group 3 did not differ significantly from unmarked groups 2 and 4 (all comparisons, $p<.01$).

TABLE 7

Frequency of the obtained levels in the post-test phase in the 4 conditions on the basis of table 1's scheme

Condition/ Level	N	INT-	INTo	INT+	S
1 (Adult, marked)	1	3	3	3	3
2 (Adult, unmarked)	9	1	3	0	0
3 (Child, marked)	7	1	0	1	0
4 (Child, unmarked)	4	0	1	1	1

Data of Table were analysed by Jonckheere test, conditions 1, 2, 3, and 4, $z = 2.66$, $p < .005$; conditions (1+3) vs (2+4), $z = 2.6$, $p < .005$; conditions 1 vs 2, $z = 3.25$, $p < .001$; conditions 1 vs 3, $z = 3.05$, $p < .001$.

These analyses indicated that social marking does not produce progress indipendently of the other factors, but that its effects are connected to the type of social interaction existing between Ss.

EXPERIMENT 2

Experiment 1 revealed that difficult children in condition 3 produced correct responses. In particular, these responses are correct in the orientation of the deskes. The correct orientation of the houses is significantly lower in condition 4 (difficult children). This fact gave rise to the hypothesis that orientation of the objects can interacts with the social marking effect.

Experiment 2 compares two conditions. In one 14 non-conserver Ss interacted with an adult who produced a schoolroom model incorrect in collocation but correct in orientation of desks. In the other condition, 13 non-conserver Ss interacted with an adult who produced a completely incorrct model, as in condition 1 of Experiment 1.

The method of experiment 2 was the same as that of Experiment 1.

The results show that in the interaction phase Ss' performances are lower in the former condition, $t(25) = 2.34$, $p < .025$, one tailed (see Table 8). In fact, children in this condition oppose adult less frequently (see mean of compliance in Table 8, $t(25) = 1.87$, $p < .025$, one tailed), because adult model are less incorrect perceptually. Their post-test results are lower than those of Ss in the completely incorrect condition, $t(25) = 3.03$, $p < .005$, one tailed (see Table 10).

TABLE 8

Mean number (max = 11 per cell) of correct response (progress) in post-test phase

Condition 1	5.69
Condition 2	2.00

The results of experiment suggest that the effects of social marking cannot be reduced to simple explanations in terms of familiarity. The cognitive restructuring is due to specific socio-cognitive conflict: in condition 1 (correct orientation of adult's model) the conflicts were less likely to occur because children were less likely to set the evidence of their solution against the partially incorrect solution advanced by the adult, they therefore tended to reproduce the adult's solutions. The post-test results were lower than those of condition 2 (incorrect orientation of adult's model), indicating that the progress were an interactive effect of marked material and conflict.

GENERAL DISCUSSION

The results from the two experiments of this study suggest that the effectiveness of social marking is linked to the way the conflict with the partner is regulated during the interaction. If the partner's model is not conflicting with the S's point of view, as in condition 3 (marked material and same-age partner) of experiment 1 or in condition 1 of experiment 2 (marked material and correct orientation of model), the social marking mechanism fails to produce the progress.

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FIGURE 1

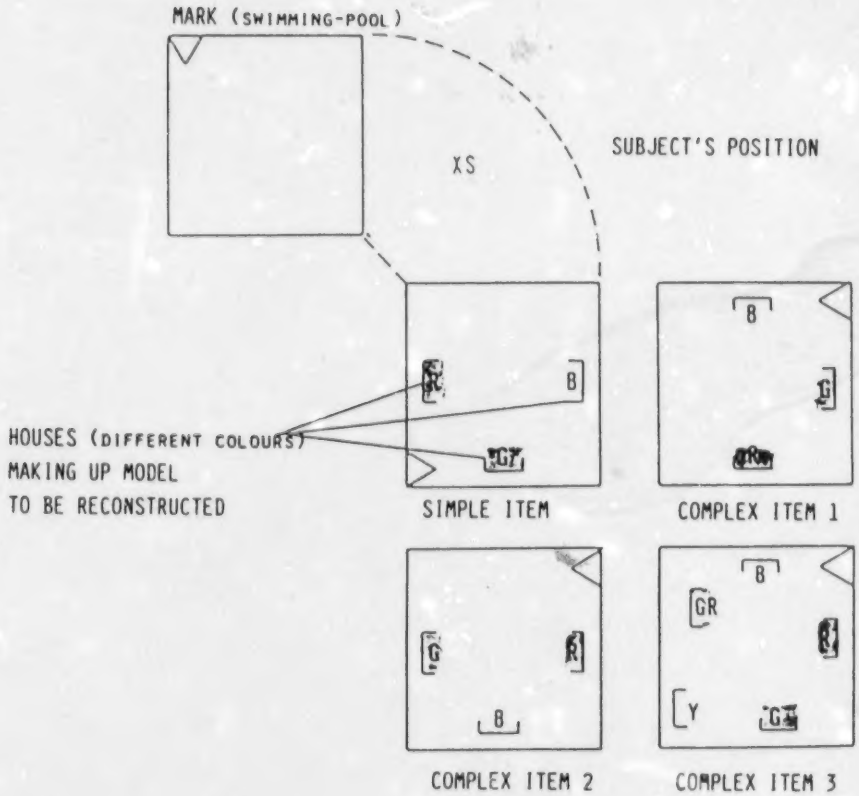

FIGURE 1 THE EXPERIMENTAL SITUATION WITH PRETEST (SIMPLE, COMPLEX 1 AND 2) AND POST-TEST (COMPLEX 3) ITEMS.

FIGURE 2

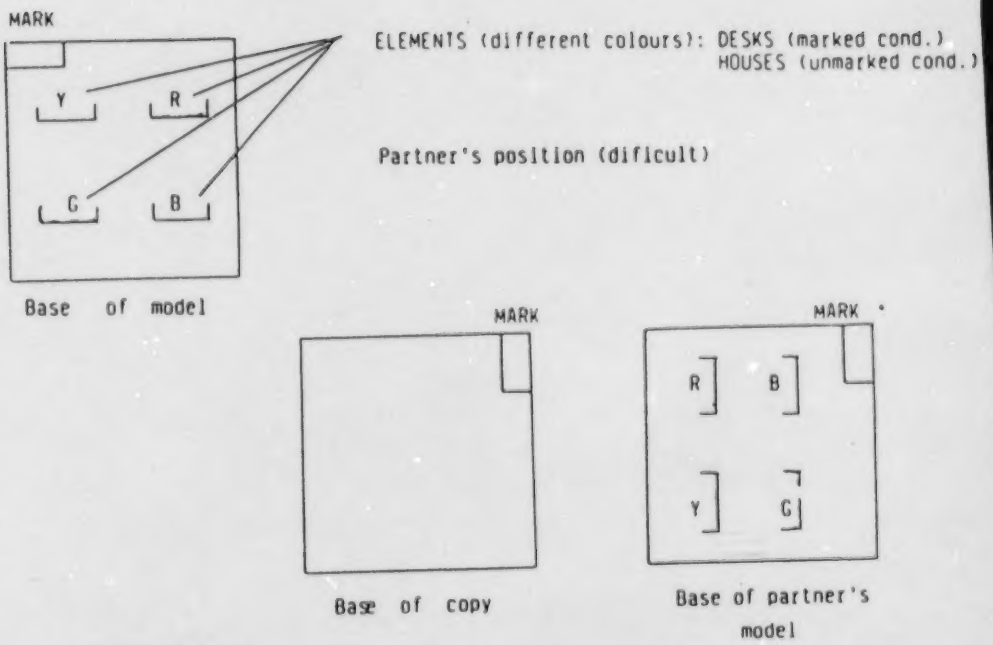

FIGURE 2. EXAMPLE OF INTERACTION ITEM AND INCORRECT ADULT MODEL

NOTE. THE INTERACTION PHASE INCLUDED 4 ITEMS OF THIS KIND, IN EACH OF WHICH THE MODEL WAS CHANGED ACCORDING TO DIFFERENT COLUR ARRANGEMENTS OF HOUSES OR DESKS.